

33 371 14014

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
7 December 2000 (07.12.2000)

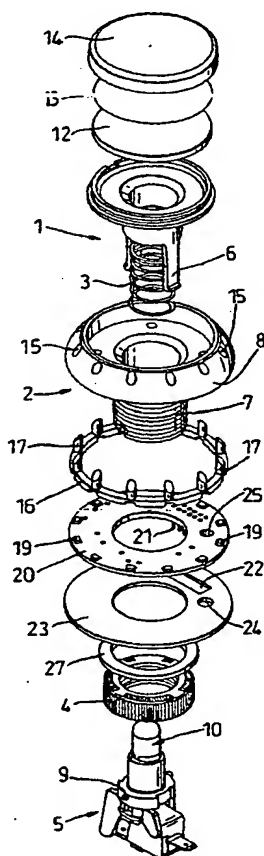
PCT

(10) International Publication Number
WO 00/74092 A1

- (51) International Patent Classification⁷: **H01H 13/02**, 9/18
- (21) International Application Number: **PCT/GB00/01353**
- (22) International Filing Date: **10 April 2000 (10.04.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9912478.6 29 May 1999 (29.05.1999) **GB**
- (71) Applicants (for all designated States except US):
GAMESMAN LIMITED [GB/GB]; Crompton Fields,
Crompton Way, Crawley, West Sussex RH10 2QR (GB).
IGT-UK LIMITED [GB/GB]; Margaret Street, Ash-
ton-under-Lyne, Lancashire OL7 0QQ (GB).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **RANDALL, Dov**,
Liam [GB/GB]; 119 Higher Lane, Whitefield, Manches-
ter M45 7WZ (GB). **HOLMES, Robert, Alan** [GB/GB];
18 Mandoville Drive, Ditton Hill, Surrey KT6 5DT (GB).
- (74) Agents: **LAINE, Simon, James et al.**; Wynne-Jones,
Laine & James, 22 Rodney Road, Cheltenham, Gloucestershire GL50 1JJ (GB).
- (81) Designated States (national): **AU, US.**
- (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- Published:**
— With international search report.

[Continued on next page]

(54) Title: **IMPROVEMENTS RELATING TO PUSH BUTTON SWITCH ASSEMBLIES**



(57) Abstract: A push button (1) can be depressed within a surrounding bezel (8) to operate a switch (5). The bezel (8) has an array of selectively illuminable lights (19), conveniently LEDs, on a circuit board (20) beneath the bezel (8). The light is transmitted in optic fibre manner by light conducting elements (17) which extend up through bores (15) in the bezel (8). These elements can be fingers (17) upstanding from a ring (16) which seats over the array of LEDs (19).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Improvements relating to Push Button Switch Assemblies

This invention relates to push button switch assemblies. It is primarily concerned with those fitted to screens or panels of amusement or gaming machines, to
5 initiate and subsequently affect their operation.

Conventionally, such an assembly shows as a translucent button, illuminated from its interior and surrounded by a plain bezel. The illumination may flash, particularly to indicate that the associated switch is "active" and will
10 produce a response if the button is pressed. But they are not very interesting or prominent features, and it is the aim of this invention to make them more noticeable and attractive to potential players.

According to the present invention there is provided a
15 push button switch assembly in which the push button is presented within a bezel, and wherein the bezel is provided with an array of selectively illuminable lights.

Although filament lamps could be used, the lights are preferably LEDs which may be mounted on a circuit board
20 concealed beneath the bezel. To convey their outputs to the upper surface of the bezel, they may be located in registry with bores or elongate apertures through the bezel, each bore containing a light conducting element which functions as a squat optic fibre. The upper ends of these
25 elements will show as spots of light when their associated LEDs are energised. The LEDs can emit white or coloured light, and it may be possible to have single or multi-

coloured LEDs to generate a mixed colour. The circuitry which controls them can be separate from or part of the assembly with a pin connection to the board.

Preferably, the light conducting elements are integrally formed with a closed loop or ring which seats over the array of LEDs, the elements being upstanding fingers in registry with respective LEDs. The structure may be likened to a coronet, and will plug into the underside of the bezel in a single operation.

The push button and bezel will usually be circular, square or rectangular, but the shape is immaterial and the bezel can be any closed loop.

For a better understanding of the invention, one embodiment will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an exploded view, in elevation, of a push button switch assembly.

Figure 2 is an exploded view, in perspective, of that assembly,

Figure 3 is a plan view of a completed assembly, and

Figure 4 is a side view of the completed assembly.

Much of this push button switch assembly is conventional. The main components are a push button 1, a housing 2, a spring 3, a clamping ring 4, and a lamp-switch unit 5. The push button 1 fits down into the housing 2 and is retained against the spring 3 by integral hooked fingers 6, one of which operates the switch of the unit 5 when the push button is depressed. The ring 4 screws on to the threaded

stem 7 of the housing 2 when that has been passed through an aperture in a screen or panel (not shown), leaving a bezel 8 proud of the screen. The lamp-switch unit 5 attaches to the base of the stem 7 by a bayonet fitting 9 (as shown) or other simple quick release arrangement, the actual lamp 10 then being within the hollow stem 11 of the push button 1.

The top of the push button 1 is recessed to receive a translucent disc 12 on top of which can be laid a transparency 13 with a word or logo, for example. Over this is fitted a lens cap 14 which will normally be just proud of the top of the bezel 8.

The bezel 8 is opaque, translucent or transparent, and is formed with an annular array of vertically extending bores 15, parallel to the axis of the housing 2. Underneath it, and concealed by its lower rim, there fits a light conductor ring 16 with upstanding fingers 17 corresponding in number and spacing to the bores 15, and with sloping upper ends. These fingers plug into the bores 15 so that those sloping ends are flush with the upper face of the bezel 8. The ring 16 can be a separate part or the product of an integral or insert multi shot injection moulding.

Beneath each finger 17 there is a notch 18 in the underside of the ring, and into these notches locate LEDs 19 on a circuit board 20. The LEDs are connected to the pins of a plug 21 on the underside of the board 20, which locates in an aperture 22 of a washer 23 that actually seats on the screen to which the assembly is fitted. The nearby small aperture 24 in the washer and a corresponding one 25 in the

circuit board 20 are to receive a pin 26 projecting down from the underside of the bezel 8. This will locate in a hole in the panel or screen to prevent the assembly rotating. The screen will be further apertured to provide access to the pins of the plug 21. The circuitry for selectively energising the LEDs is not part of the assembly but is connected via the plug 21.

Another washer 27 is interposed between the top of the clamping ring 4 and the underside of the screen.

The LEDs 19 may be white or coloured, and when energised the light that they emit will travel up the respective fingers 17, as in an optic fibre, and show as bright spots around the bezel. They can be selectively energised so that as they turn on and off, so the light spots twinkle or alternate, or generally create a changing pattern. This applies to translucent and transparent bezels as well as opaque ones since the interfaces between the fingers 17 and the bores 15 still ensure that the tips of the fingers are bright when the LEDs are energised, while allowing some light to leak into the bezel and causing that to glow.

As well as providing an attractive display of light, the feature could also be used to interact with the machine game.

CLAIMS

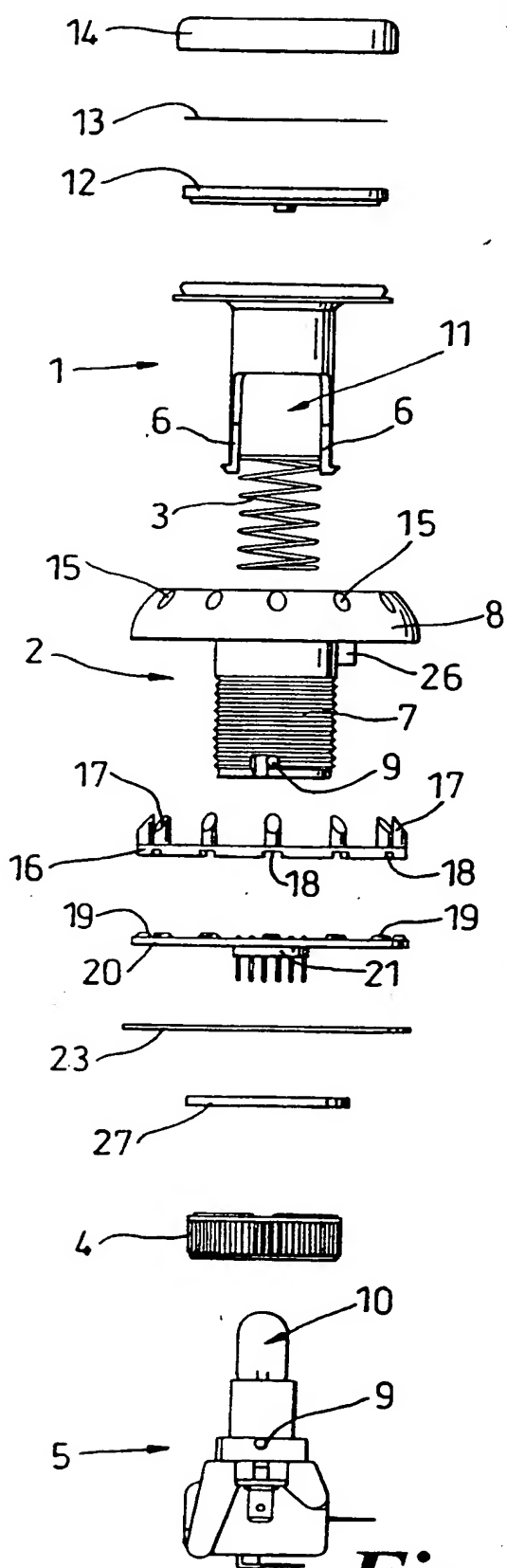
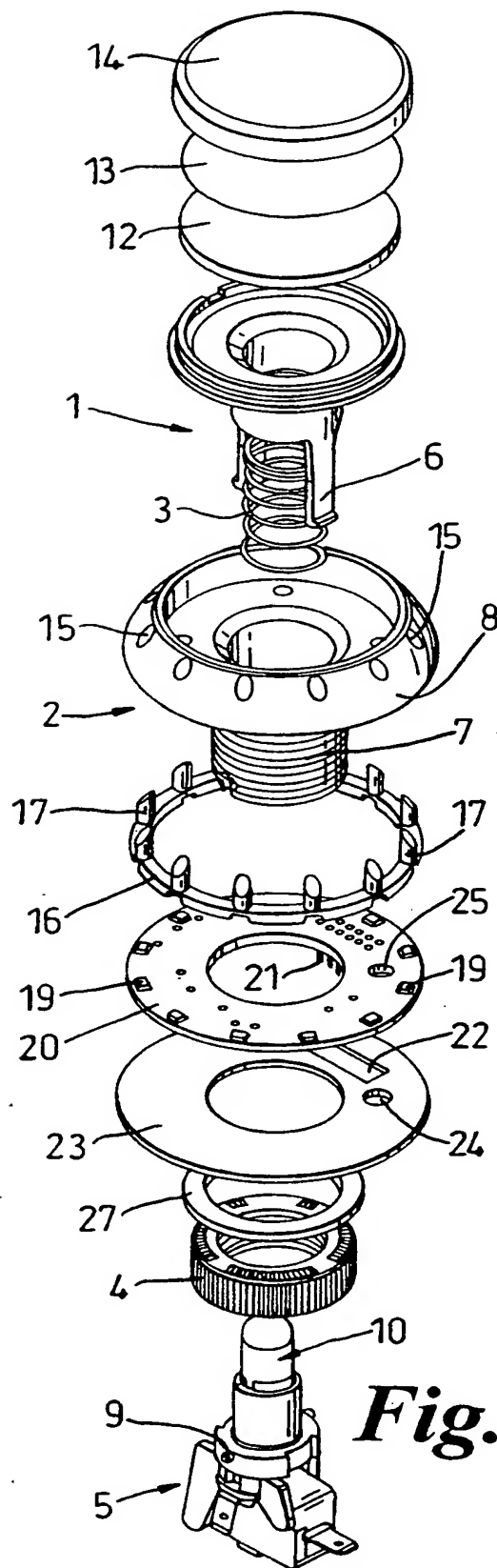
1. A push button switch assembly, in which a push button is presented within a bezel (8), characterised in that the bezel (8) is provided with an array of selectively
5 illuminable lights (19).

2. A push button switch assembly as claimed in Claim 1, characterised in that the lights are LEDs (19) mounted on a circuit board (20) concealed beneath the bezel.

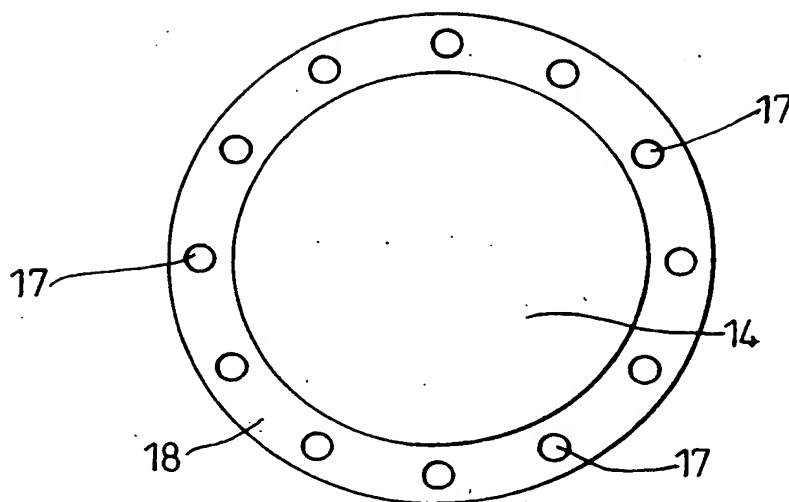
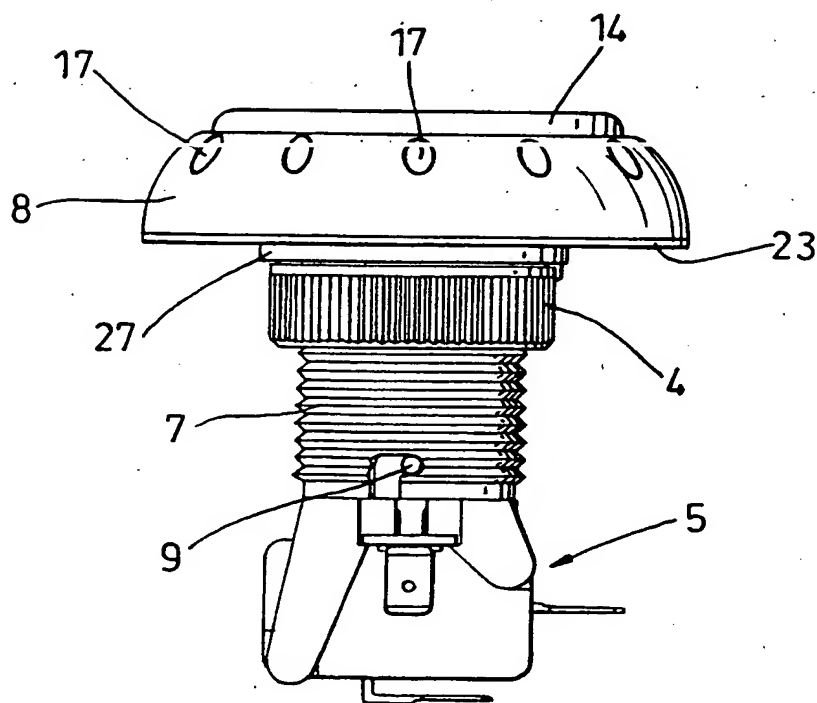
3. A push button switch assembly as claimed in Claim
10 2, characterised in that the lights (19) are located in registry with bores or elongate apertures (15) through the bezel (8), each bore (15) containing a light conducting element (17) which acts as an optic fibre.

4. A push button switch assembly as claimed in Claim
15 3, characterised in that the light conducting elements (17) are integrally formed with a closed loop or ring (16) which seats over the array of LEDs (19), the elements being upstanding fingers (17) in registry with respective LEDs (19) and which plug into the bores (15) in the bezel (8).

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**Fig. 1****Fig. 2**

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*Fig. 3**Fig. 4*

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/01353

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01H13/02 H01H9/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 297 12 888 U (LAUX PETER) 9 October 1997 (1997-10-09) the whole document	1
Y	US 5 833 350 A (MORELAND GREGORY B) 10 November 1998 (1998-11-10)	1
A	page 9, last paragraph; figures 1,2	2
Y	EP 0 353 343 A (EASTERN CO) 7 February 1990 (1990-02-07) abstract; figure 1	1
A	EP 0 567 357 A (OTIS ELEVATOR CO) 27 October 1993 (1993-10-27) abstract; figure 4	1,2

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

13 July 2000

Date of mailing of the international search report

19/07/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Janssens De Vroom, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/01353

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

International Application No

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